

25. $\vec{p}_{\text{before}} = \vec{p}_{\text{after}}$
 $m_H = 47 \text{ kg}$ $m_C = 72 \text{ kg}$
 $V_H = 2.2 \text{ m/s}$ $V_C = 3.1 \text{ m/s}$
 $m_H V_H + m_C V_C = (m_C + m_H) V_{C+H}$
 $(47 \text{ kg})(2.2 \text{ m/s}) + (72 \text{ kg})(3.1 \text{ m/s}) = (72 \text{ kg} + 47 \text{ kg}) V_{C+H}$
 $(103.4 \text{ kg m/s}) + (223.2 \text{ kg m/s}) = (72 \text{ kg} + 47 \text{ kg}) V_{C+H}$
 $V_{C+H} = 2.7 \text{ m/s}$

31. $F = 1.23 \times 10^7 \text{ N}$
 $\Delta t = \frac{21.0 \text{ ms}}{1000} = 0.021 \text{ s}$
 $\vec{J} = F \Delta t$
 $J = (1.23 \times 10^7 \text{ N})(0.021 \text{ s})$
 $J = 258300 \text{ N s}$

35. $m = 1.5 \text{ kg}$ $V_f^2 = V_i^2 + 2ad$
 $d = 1.75 \text{ m}$ $V_f = \sqrt{2(9.8 \text{ m/s}^2)(1.75 \text{ m})}$
 $V_i = 0 \text{ m/s}$ $V_f = 5.9 \text{ m/s}$
 $\vec{J} = m \Delta V$
 $J = (1.5 \text{ kg})(5.9 \text{ m/s} - 0 \text{ m/s})$
 $J = 8.85 \text{ kg m/s}$

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